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PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference KL/LMS/41060	**FOR FURTHER ACTION**	See Form PCT/IPEA/416
International application No. PCT/GB2004/003455	International filing date *(day/month/year)* 11.08.2004	Priority date *(day/month/year)* 13.08.2003
International Patent Classification (IPC) or national classification and IPC B63C3/06, B63C1/02		
Applicant THOM, Donald Scot		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 4 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☒ *sent to the applicant and to the International Bureau)* a total of 5 sheets, as follows:
      ☒ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

☒	Box No. I	Basis of the opinion
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

Date of submission of the demand 09.03.2005	Date of completion of this report 02.11.2005
Name and mailing address of the international preliminary examining authority: European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized Officer De Sena Hernandorena Telephone No. +31 70 340-2704

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/GB2004/003455

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-11
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-11
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-11
	No:	Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/GB2004/003455

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

   ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
   - ☐ international search (under Rules 12.3 and 23.1(b))
   - ☐ publication of the international application (under Rule 12.4)
   - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages	
2-9	as originally filed
1, 10	received on 15.03.2005 with letter of 09.03.2005
Claims, Numbers	
1-11	received on 15.03.2005 with letter of 09.03.2005
Drawings, Sheets	
1/2, 2/2	as originally filed

   ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

* *If item 4 applies, some or all of these sheets may be marked "superseded."*

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (SEPARATE SHEET)

International application No.
PCT/GB2004/003455

The application refers to the field of floating docks able to lift a ship from the water in order to expose her submerged part for inspection and repairs.

The closest state of the art is considered to be the document FR 2822799, which discloses a floating dry dock that is hinged to a pier and has at its distal part a floodable float connected with the hinged part by two arms that have positive buoyancy.

When the system dock-boat reaches a position where the water has uncovered the lower part of the boat and has not yet arrived to the wide part of the dock, a situation of low stability arises due to the low inertia moment of the plane of intersection of the water and the system dock-boat. This low stability is normally corrected by increasing the dimensions of the dock, which implies higher costs in terms of materials, construction and operations.

This problem is solved by the features of the characterizing part of the newly filed claim 1, namely by designing lifting arms that achieve a substantially constant water plane area for the system dock-boat.

This combination of features is neither disclosed nor suggested by the available prior art and therefore, the application complies with the requirements of novelty and inventive step set up by Articles 33(2) and 33(3) PCT.

15-03-2005

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(55)

Floating Dry Dock System

This invention relates to dry dock systems for use in lifting vessels out of the water for maintenance or repair purposes. Typically these types of docks can lift anything from one to several hundred tonnes.

There are basically two types of dry dock. There are those comprising a lock that has at least one closable door into which the vessel is floated, and the water is drained from the lock to leave the vessel high and dry.

A second type of dry dock system comprises a floating dock that consist of a raft that is floated to a region ahead or astern of the vessel and submerged so as to be positioned beneath the vessel. The raft has floatation chambers built into the walls of the raft so that they can be purged of water by displacing the water with compressed air. A major problem with this type of dock is that the amount of required "water plane" makes these types of docks highly unstable. "Water plane" is defined as the area of water at the water air interface which is displaced by a part of the dock. In general the greater the "water plane" the greater will be the stability of the dock. As these docks lift a boat out of the water, there is considerable "water plane" provided by the engagement of the boat hull with the water, but it becomes particularly dangerous as the "water plane" decreases when the hull is lifted out of the water and eventually loses contact with the water. As

instead of mounting them in the arcuate tracks 26. This is shown schematically in Figure 3.

Referring to Figure 3 the platform 22 is of generally rectangular shape and the arms 15 need not be of an arcuate shape but could simply be elongate arms 15 as shown. In this case, the cradle 11 may simply comprise the two arms 15 interconnected by a single buoyancy tank 34 at a free end of the arms 15.

In order to maintain the platform 22 in a horizontal and stable state, the corners of the platform 22 are interconnected to each of the arms 15 by way of a platform support means in the form of pairs of links 36, 37. The links 36, 37 of each pair may be in the form of hydraulic pistons that are interlinked so that the links 36 and links 37 expand or contract when the arm 55 is raised by introducing compressed air into the tank 34 or lowered when the tank 34 is flooded in a controlled manner thereby ensuring that the platform 22 remains horizontal throughout all movements of the arms 15. In this case, the centre of gravity of the platform 22 remains at a fixed radius relative to the pivot about which the arms 15 rotate.

Claims

1. A floatable dry dock (10) for lifting a vessel (14) in or out of the water, the dry dock comprising a buoyant base ( ) having one or more buoyant hulls, a lifting cradle, having two spaced arms pivotally mounted on the one buoyant base, one or more floatation tanks interconnecting the arms, and a platform mounted on the arms, a platform for supporting the vessel during lifting or lowering of the vessel in tto or out of the water, and a platform support means operable to ensure that the platform remains horizontal when the arms pivot about their pivotal attachment to the base characterised in that during lifting and lowering of vessel the combined area at the interface between the water surface and the air of the vessel 14, the one or more hulls, the arms 15, and the arms remains substantially constant and thereby stabilises the dry dock.

2. A dry dock according to Claim 1, wherein the platform has wheels at an extremity of the platform and the platform support means comprises an arcuate track on each arm along which the wheels of the platform run when the arms are pivoted whilst maintaining the platform in a horizontal altitude.

3. A dry dock according to Claim 1 or Claim 2 wherein the arms are of an arcuate shape and there is a plurality of elongate floatation tanks extending between the arms to define a part cylindrical cradle.

4. A dry dock according to claim 4 wherein the base comprises a catamaran hull.

5. A dry dock according to Claim 4 or Claim 5 wherein the base comprises a sidewall located at each end of the hulls of the base and the pivot about which the arms rotate is located on an axis between the hulls that extends along the length of the hulls.

6. A dry dock according to any one of the preceding Claims wherein a single floatable cradle is mounted on the base.

7. A dry dock according to any one of Claims 1 to 6 wherein two spaced floatable cradles are mounted on the base.

8. A dry dock according to any one of the preceding Claims wherein the arms comprised inflatable buoyancy tanks.

9. A dry dock according to any one of the preceding Claims wherein the platform is pivotally mounted between the arms and the platform support means comprises pairs of extendable and contractable links, the links being operable to expand or contract during lifting or lowering to ensure that the platform remains horizontal relative to its axis of pivotal mounting on the arms when the arms are raised or lowered.

10. A dry dock according to Claim 10 wherein the platform is of generally rectangular shape and one link of each pair of links is provided at a corner of the platform and the other link of each pair of links is provided at a respective opposite corner of the platform.

11. A dry dock according to Claim 10 or Claim 11 wherein the arms are elongate arms mounted at one end on the base and having a buoyancy tank provided at a second end of the arms, and the platform is mounted on a pivot at a region intermediate the ends of the arm.